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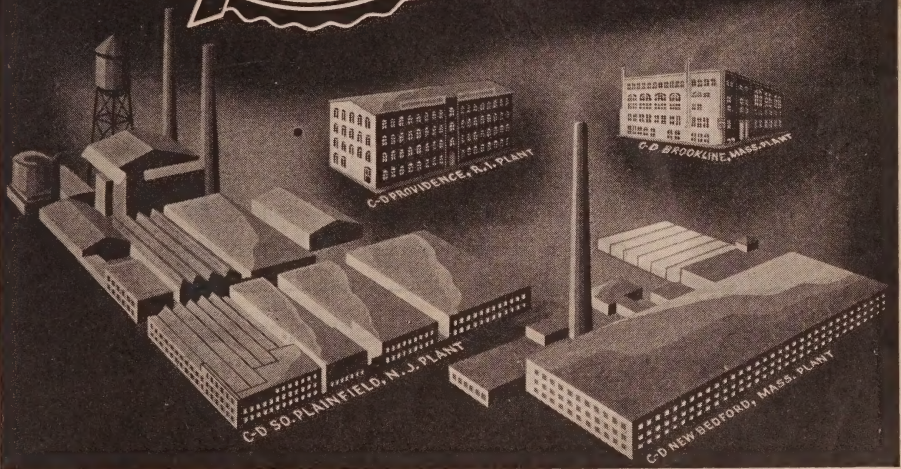

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The provisional Constitution and By-Laws provide for the following classes of membership and dues:

a. Life Membership—$50.00.

b. Full Membership—$4.00 annually.

c. Group Membership—$100.00 annually. Open to all firms, companies, and associations interested in promoting the cause of industrial preparedness, particularly in connection with research, development, operation, production, manufacture, and supply of communication, electronic, motion picture, and photographic equipment. Group members have the privilege of nominating five (5) of their officials or employees who are American citizens to be full members in the Association without dues. For each member in excess of five (5) nominated by a group member, the annual dues are $4.00.

d. Student Membership—$2.00 annually. Open to all men and women who are students in technical courses in schools and colleges.

Members are entitled to the official publication of the Association, which will be published bi-monthly, and to such other publications as may be issued periodically.

It is planned to organize local chapters throughout the United States at places where there is a group large enough to organize and maintain such a chapter.

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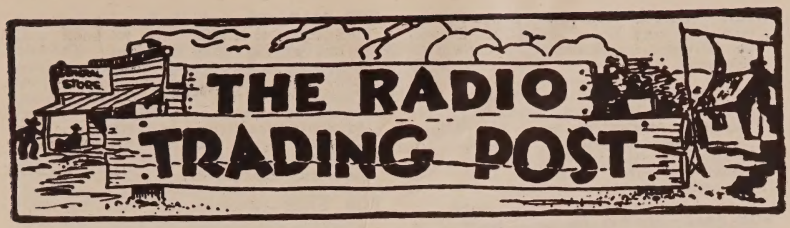
If you are now connected with the armed forces check component.

Present or Past Military Grade ..... Serial Number .....

Occupation or Type of Business ..... Title .....

Signature .....



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Please limit your ad to a maximum of 40 words, including name and address. Advertisements will be run as promptly as space limitations permit.

WANTED—All electrical service shop. Construction, maintenance, appliances, sales and service, radio. Purchase, lease or management. Write full details. R. L. Edwards, Jr., 1605 Irving St., N. W., Washington 10, D.C.

FOR SALE—¾ HP Leland motor, 1 phase, 1160 r.p.m., 110-220, 60 cycle, like new, $50. Also ¼" Black and Decker electric drill, $25. Also Capehart auto. record player changer and amp. M. Funk, 114 Ralph Ave., Brooklyn 21, N. Y.

TRADE OR SELL—RME45 receiver, 75 hours used; SX25, excellent shape. New Meissner signal splicer and unisignal selector. VX101JR, band-switching, etc. Want Rider's manuals, test equipment, parts. All inquiries answered. Frest Radio, 811 21st St., East Moline, Ill.

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FOR SALE OR TRADE—10,000 volt 23 ma. oil burner transformer. 5,000 volt tap. Want 8 mm projector in good condition or what have you? State offer. Prefer New York City offers. George Wechsler, 1729 E. 17 St., Brooklyn 29, N. Y.

FOR SALE—New 30 watt amplifiers, using tubes 2-7B4, 2-7N7, 2-6L6, and 1-5U4, $85. Amplifiers and accesories available for immediate delivery. National Radio-Amplifier Co., Royalton, Ill.

FOR SALE OR SWAP—Radio engineering, electrical, and radio servicing books. Also assorted Audels books. All new, all one-third off list, or will swap for radio test equipment. Walter Israel, 97 Washington Ave., Winthrop 52, Mass.

FOR SALE—Brand new Speco model STAP, ac-dc signal tracer. Cost me $44.95, you can have it for $27.50 as I am closing shop. Send check, money order or C.O.D. order to M. H. B. Hoffman, 4112 Gallatin St., Hyattsville, Md.

FOR SALE—Vibrator power supply made by Philco, model ST-3, uses one 84 tube. Complete with tube, ready to go. Just the thing for that portable receiver. $7. Richard Bruce, 1171 Union St., Manchester, N. H.

FOR SALE OR EXCHANGE—Phono-oscillator (25Z5, 6A8), $4.50; heavy duty Oxford 12" speaker, 80 tube power supply and case, $10; heavy duty p.a. stand, extends 12', aluminum baffle, 22" opening, $22; Christy Appliance Course, $6. Arnold Radio, 1916 Corby, Omaha 10, Nebraska.

SELL OR SWAP—Rider's record changer volume, new, $5; 2 dual 40-watt industrial-type fluorescent light fixtures, easy to hang, new, $12 each. Sell or trade for technical books or radio parts. Robinson Radio, 3647 Main, Kansas City, Missouri.

FOR SALE—Kit to convert your home or auto receiver into a two way radio. Complete with tube, wire, cabinet, etc. $5.95. Roberts' Radio Television, 595 Vincente Ave., Berkeley 7, Calif.

WANT — Surplus generator, Leece-Neville type M2, part No. 4228-S-24225, 24 volt dc, 50 amps, in A1 condition. Lewis C. Chapman, Rt. 1, Box 92, Columbus, Miss.

FOR SALE—Electronic experimenter's kit. A complete electronic laboratory for the beginner, student or hobbyist. Perform 18 different experiments with this kit. Reasonably priced. Write for free illustrated literature. James W. Deer, 1340 Milvia St., Berkeley 9, Calif.

FOR SALE—Sparton 485 radio tubes, 6 at $1.50 each. New but not in original cartons. Also QST Amateur mag. 1937-42, with few issues missing. Radio mag. 1937-41, many issues missing. Bill Denison, 9937 S. Carpenter St., Chicago 43, Ill.

SELL OR SWAP—Brand new hi-fi p.a. amplifier. Features are 8 watt output, separate bass and treble controls, mike and phono inputs, inverse feedback. Also have F8P Utak speaker in wall cabinet. Need 16" turntable or other recording equipment. F. J. Haney, 3543 Ella St., Philadelphia 34, Pa.

FOR SALE—Condensers and many other radio parts. Send for list and prices. Ernest Zaccaro, South Country Rd., Bellport, N. Y.

FOR SALE — Speed-O-Print mimeograph machine, prints 8½"x11" sheets, price, $25. GE tube tester, model TCP-3, new. Tests all tubes, $50. Howard model 430 communications receiver, has 5 bands, 55-42 mc., $35. Federal recorder, dual speed, 10" Jensen speaker, portable, $250. Terms 50% with order, balance C.O.D. plus charges, F.O.B. Los Angeles. F. U. Dillion, 1630 N. LaBrea Ave., Los Angeles 28, Calif.

FOR SALE—Complete new Meissner 150-B transmitter, HQ-129-X receiver, best offer. Pick it up at 48 Hawthorne, St., Lowell, Mass., Theodore Ferus.

FOR SALE—Motor-generator, 120dc-120ac, 60 cycle, 300 watt output. Built in filter output voltage control. Excellent condition. Ideal for operating an amateur radio station or public address system on dc. New Era Club, Inc., 274 East Broadway, New York 2, N. Y.

FOR SALE—RCA velocity microphone, model 74-B, for 200 ohm or high impedence input. Complete with instructions, $20. Also University speaker driver unit, for use with exponential horn. Both units in perfect operating condition. George E. Beggs, Jr., Warrington, Pennsylvania.

FOR SALE—Tubes, new, hard to get numbers,. Write your needs. Other hard to get parts. All inquiries will be answered., A.B.C. Radio Co., 573 Dumont Ave., Brooklyn, N. Y.

FOR SALE—275 units Audio development transformers, A2398 line to push pull grids; 500-600 ohm pri. imp.; 40M-48M ohm sec. imp.; frequency response down 2db. at 20 cps, also down 2db at 1500 cps; smooth response no peaks; max. operating level pri. volts 10; potted totally enclosed unit in rectangular can 2x2½x3 inches; black crackle finish; terminal board no bottom. Price $3 ea. Superior Electric Co., Bristol, Conn.

FOR SALE—Recomar '33' 3¼" by 4¼" camera. Compur shutter 1 to 1-200 sec., Kodak f4.5 lens, with Abbey flashgun, 10 film holders, pack adaptor, carrying case. $70 complete. Lloyd Rohrich, Perrysburg, N. Y.

FOR SALE—General Electric, model LB530 portable with self-contained storage battery, practically new, $35. Standard signal generator, 15 to 25, 190 to 230 mc., cost $268, perfect, $49.50. Webster deluxe record changer and recorder, mixes 10" and 12" records, used twice, $95. J. W. Bourke, 148 Winthrop St., Brooklyn 25, N. Y.

FOR SALE—Modern and hard-to-get out-of-date tubes below list price. Write for free list. Belltone Radio, 167-04 111 Ave., Jamaica 5, Long Island, N. Y.

FOR SALE—Photostat copies of your radio diagrams, price lists, anything. 8x10 or 8½x11, 15 cents; 11x17, 20 cents; one-third off in 100 lots. Other sizes, send for list. Glossy photo prints add 1 cent each. Catalogs, etc., composed and printed, send material for low price. Fred W. Hoehler, 53 Floyd St., Staten Island 10, N. Y.

FOR SALE — 4 E1MAC50T tubes, never used, and 2 832A at $5 each. Also 2 866A at $1 each; 2 812 new at $3 each; 1 826 at $5. Also have 829B, 837, 723A-B, TZ20 at bargain prices. W. L. Thiel, Rib Lake, Wis.

FOR SALE — New Dumont 274 scope, $99.50, like new Meissner 150-B transmitter with signal shifter, 35 watt phono-cw rig on ten, other items. Wayne Storch, Beecher, Ill.

WANTED—HRO in perfect condition with coils. Will sell or trade NC-100 ASD receiver (same as NC-100A), plus spare parts kit, condition new. Ben Mueller, 736 Rittenhouse St., N.W., Washington 11, D. C.

FOR SALE—New guaranteed tubes at discounts. Write for list or include deposit for C.O.D. shipment. Closing shop. Ed Howell, 501 W. Harden St., Graham, N. C.

FOR SALE OR SWAP—Mallory and Radiant vibrators. Write for list of types. Leon Bolender, R.F.D. 1, Chilo, Ohio.

(Continued on page 12)

AUTO RECEIVER SERVICING*

Servicing an automobile receiver is in many respects no different from servicing an ordinary receiver, with capacitors broken down, resistors open, etc. But there are some factors that are peculiar to the auto set. It is usually quite compact and may be somewhat critical with respect to alignment, microphonic tubes, intermittent operation, noise, vibrator troubles.

Obviously, the automobile receiver must operate under difficult conditions. The antenna used with it cannot be very long or very high, hence sensitivity is important. Because of the high noise level of the auto ignition system, special installation precautions are necessary. The vibration of the car engine and mechanical shocks on the road make reliability and rugged construction essential requirements. The location of the auto set next to the firewall of the car makes protection from heat necessary. Because of the difference in the characteristics of the car interior, acoustically, and the acoustic properties of the average room in the home, a different type of audio response is necessary; usually tone controls are provided to secure the best results under varying conditions. Still another factor is ease of operation, leading to the development of push-button tuning and with it certain problems of installation and servicing.

A general understanding of basic radio theory is essential before one can service an auto set or solve installation problems that often crop up. Unskilled labor can be used to a certain extent under supervision in making installations, and often due to the design of the car and the relatively simple installation instructions that may come packed in the carton of the new radio, installations may be accomplished by the relatively untrained with fairly good results. It's the unusual and the difficult jobs that stop the man with a feeble knowledge of radio.

Ignition Circuits

With used cars being sold and resold, there may arise the necessity of moving one set to another car, which is not a new installation in a certain sense and may present new problems. For example, the set may have a synchronous vibrator. If the polarity is different in the new car, a change in the vibrator circuit will be required. This requires a knowledge of ignition circuits; Fig. 1 illustrates a basic circuit.

When the ignition switch is closed and the interrupter switch is also closed, a current flows in L_1 and rises suddenly. The rise in magnetic flux through the core, because of linkage with L_2 induces a high voltage in L_2 due to the high step-up turns ratio on the transformer. The high voltage across L_2 is fed to the various spark plugs through a distributor switch, permitting firing of each plug in the proper order. The interrupter switch may be geared to the engine to provide a regular, periodic breaking of the primary circuit so that pulses of current flow in the primary to give the varying field required for transformer operation. The sparking at the interrupter is absorbed to a certain extent by the capacitor, C, but some interference inevitably results. Also, there is sparking at the plugs, with further noise generation. To limit the noise, it sometimes proves helpful to shunt a capacitor directly across the battery terminals. This capacitor should be of the shielded type, with the shielding grounded to the car frame. The noise may also be cut down by using a suitable suppressor in series with the distributor arm and individual suppressors on the various spark plugs. First a suppressor should be tried on the distributor and then if necessary suppressors can be tried on each plug. Spark plug suppressors should not be used

* *By Willard Moody in "Service."*

unless required since they tend to cut down engine efficiency. In some cases it is practical to shield the wiring to the distributor arm and to the spark plugs, but usually this cannot be done

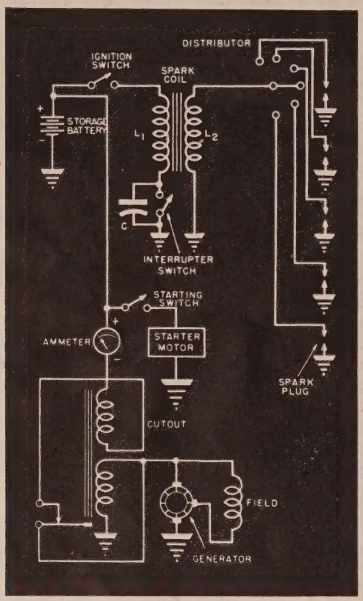


Fig. 1. Basic ignition circuit of car. Ammeter and generator connections appear at lower left. Bypass capacitor has been omitted.

or not very economically. In some airplane installations the wiring may actually be shielded and bonded to the frame of the plane for minimizing noise and interference.

The ammeter and generator connections are shown in the lower part of Fig. 1. Usually a capacitor is connected from an ammeter terminal on the dash or instrument panel to the panel metal for grounding. Another capacitor of the shielded type may be connected between the generator and ground, with the car frame serving as the ground, or the engine block. If the engine is floated on rubber it may be necessary to bond it to the frame of the car using flexible copper braid which has been tinned for protection from corrosion and easier soldering. The bypass capacitor connections are not shown in the drawing, as they are so simple to make. The cut-out operates so that the battery will not discharge into the generator when the generator voltage falls below that of the battery. If noise is heard due to make-and-break action at the contacts, they may be shunted with a capacitor, but this is not usually necessary.

In Fig. 1 the positive terminal of the battery is insulated from ground, the negative is grounded. In some cars reversed polarity for the ignition system is encountered. If the receiver uses a non-synchronous vibrator and tube rectifier, the polarity doesn't matter; for the synchronous vibrator circuit the polarity may be shifted by reversing the leads to the primary or secondary windings of the vibrator, but **not** to both windings.

A typical basic synchronous vibrator circuit is shown in Fig. 2. C_1 is an r-f bypass, C_2 the usual buffer, and C_3 and C_4 filter capacitors. This type of vibrator functions as a mechanical rectifier as explained in standard texts.

The non-synchronous vibrators are more commonly encountered; a set

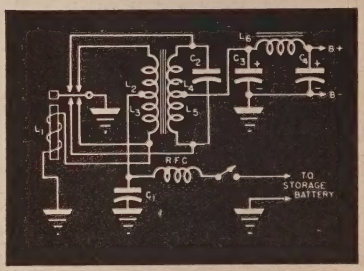


Fig. 2. Synchronous vibrator circuit.

using this type of circuit is shown in Fig. 3 (Silvertone 7091). The OZ4, used sometimes, causes a great deal of

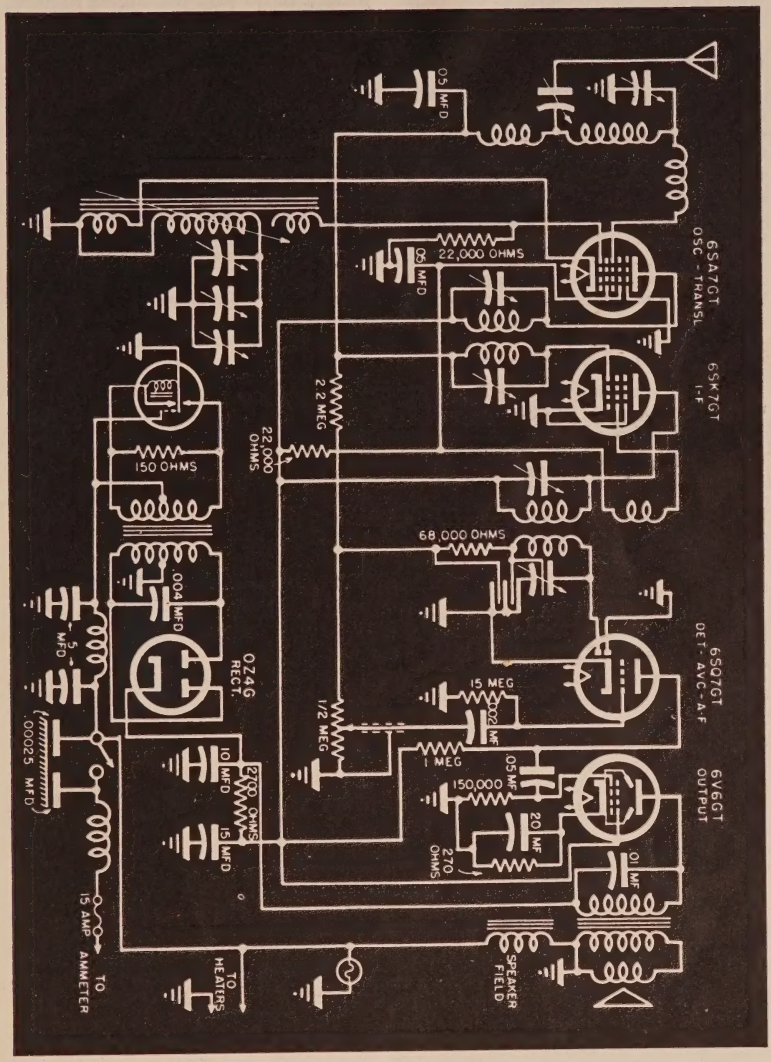


Fig. 3. Silvertone auto set, model 7091, using a non-synchronous vibrator.

noise and can be replaced, in the rectifier circuit, with a full-wave rectifier of the 6X5GT type having a high-vacuum design.

One of the most commonly encountered jobs in auto radio is getting rid of noise. Servicing the set itself for a noisy or intermittent condition is much like servicing an ordinary receiver for the same troubles, since the circuits are standard and basic servicing techniques apply. The essential differences occur in the type of installation of the car set. Recognition of the noise and identification are helpful in servicing.

Noise Remedy Procedures

(1) Try the set with car standing still and engine not running.

(2) Allow the engine to idle or run at a slow speed while the car stands still.

(3) Speed up the engine with car standing still.

(4) Drive the car and note the interference.

If the noise is heard with the engine not running, the fault lies in the set itself in all probability. A defective vibrator may cause excessive noise, as may a leaky or open buffer capacitor. A leaky filter that is increasing the drain on the power supply will cause the vibrator circuit current to go up, producing excessive sparking at the contacts and noise. A microphonic or intermittently shorting tube may cause noise. A poor contact in the voice coil circuit or an off-center cone may make noise evident. Distorted and off-center cones are very commonly encountered in auto radio work. The extremes of temperature and humidity make cones troublesome. A loose rattle type of sound may be due to a tube shield that is not seated firmly or to vibration by sound waves of some object on the dash, perhaps a cigarette ash tray or some other device.

If noise is heard while the car is not in motion and engine not running, the fault most likely is in the set. If the noise is heard with the engine running, the vibration of the motor through the car may be causing an intermittent contact of some part in the receiver, or it may be a case of engine noise.

With practice, the various types of noise can be recognized. Disconnecting the antenna and finding that the noise remains usually indicates a faulty set or an ignition-suppression job. For example, an open capacitor from ammeter to dash, or poorly made connection, or a similar fault in the generator capacitor bypass circuit could be responsible. Sometimes it's merely a matter of getting a good clean contact. There may be considerable grease and dirt in the vicinity of the generator.

A poor antenna or no proper grounding of the shielding may cause the set to be excessively noisy. The fitting of the antenna cable plug into the radio must be made properly. Noise at high engine speeds may show a faulty generator which needs a commutator cleaning job or new brushes. Noise heard with the car in motion may be due to tire static. Noise suppressors in the hub caps, or metallic painting on the tires, may help in getting rid of the noise.

Finally, with regard to replacement of vibrators the circuit should be checked carefully with an ohmmeter before installing a new vibrator. Otherwise, the replacement may be damaged. If buffer capacitors are replaced, use the same capacitance rating that was used originally and a voltage rating equal to or greater than the original.

Servicing auto sets is a dirty, back-breaking and often quite laborious job. If possible, enlist the aid of a worker, who may be relatively unskilled, to do the heavy work while you supervise operations and bench repairs. Functioning efficiently in this type of work is important if costs to customers are to be kept reasonably low and profits reasonably high. The work is often more difficult than servicing home models, but can be more profitable.

(Continued on page 15)

RECORD CHANGER SPEED FAULTS*

Practical Repair Tips on Specific Turntable Motors
Important Pointers to Guide Your Player Servicing

(Continued from last issue)

In using replacement motors to replace a manufacturer's type, care should be taken that the motor spindle or drive bushing is of the same thickness. If the spindle is thinner, speed will be slower. During the war, the author undertook a small contract to repair some phono demonstrators that had burnt out motors.

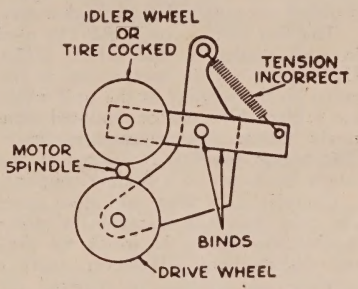
When Standards Vary

Upon inspection it was found that the drive mechanisms were not standard, but were built by the manufacturer of the machine specially around what appeared to be a fifty cycle motor spindle. The problem was solved by using the only procurable type of motor at that time, a straight sixty cycle job and a standard fifty cycle conversion spring, which was obtainable from another set manufacturer.

If an assortment of springs is on hand, the servicer can do wonders in substituting one rim drive motor for another. Servicers whose customers live in those parts of the country having direct as well as alternating currents will especially appreciate these suggestions.

With so many of our table model combinations using ac-dc chassis it is only natural for the consumer to turn on his phonograph motor when he moves into a d-c apartment. For when the receiver is plugged in and reception is achieved, the consumer unwittingly expects the turntable to work since his radio is bringing in stations. This fact alone accounts for a large percentage of motor replacements in d-c areas.

When a motor spindle spring is installed, care must be used to make sure that the turns are laid down closely together, with no sharp edges or ends to chew up the idler or turntable rubber tire.



Check tension of RP-151 idler wheel spring.

Often a way can be found to adjust speed by loosening the motor from its mounting or platform and by shifting the mounting angle. This brings the drive wheel up or away from the turntable and can be counted upon to make some difference in rotating speed.

In doing this, remount the motor spindle in such a manner that it is perfectly parallel to the turntable spindle, and with the driving surface perpendicular to the driven surface of the turntable.

Spindles Give Trouble

Bent motor spindles are another cause of varying and slow speed. Even a slight "wobble" in a motor spindle is sufficient to slow down the motor appreciably. Bent turntable spindles, on the other hand, produce varying speed effects, or wows.

** By Louis Loshak in "Radio and Television Retailing."*

Also take a moment to straighten the fan on models employing them. While the later production units do not have felt washers, a few drops of oil should be squirted into the bearings just the same.

Our discussion of speed problems has been limited to those taking place at the primary source, the motor. To examine every speed problem and its cause would take volumes. However it will be worthwhile to go into a brief analysis of three popular RCA mechanisms and the unusual speed problem encountered in these changers.

The first mechanism is RP-139 used in such models as the U125, U129, U130, etc. This mechanism is familiar to the servicer as the unit which has a Black Flyer motor mounted separately below the mechanism itself. The phono panel is connected to the motor by means of a flexible coupling.

Complaints of wow and slow speed are quite generally traceable to motor trouble the service of which we shall not discuss here. However many a servicer has replaced or repaired the motor on this machine only to find that the trouble reappears in a short time.

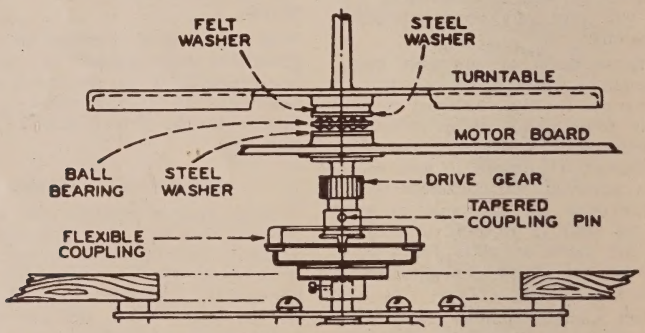
To discover the reason for repeated motor trouble, disconnect the flexible coupling between the motor and turntable. Place a marker on the turntable. Spin the turntable by hand sharply. Count the ensuing revolutions. The turntable should rotate freely and twelve complete revolutions should result.

In the case of changers RP-158, -160, -161, and -162, the same procedure can be followed by applying power until the turntable has reached full speed, and then pulling the motor and idler away from the turntable. As before, twelve complete turns should be made. If this does not happen, then rest assured that repeated motor trouble has a cause. Proceed as follows.

Remove the changer panel and place it on a bench. Disassemble the turntable by knocking out the pin that holds the copper coupling below. Now you may find difficulty in removing the turntable as it seems to be frozen to the bearing. Tap the sides of the turntable sharply and pull up. Once the assembly is apart you have two choices as to the method of repair.

The first, is to sandpaper down the lower spindle, clean out the bearing, oil, grease, and reassemble. Very fine crocus cloth or emery cloth should be used, if available. If not, use a fine grade of sandpaper. Clear out any foreign particles, such as bearing metal, watching for set screw burrs as well.

Bevel the top edge of the top bearing slightly with a knife or scraper. Clean the shaft and the bearing with carbon tetrachloride, removing oil and



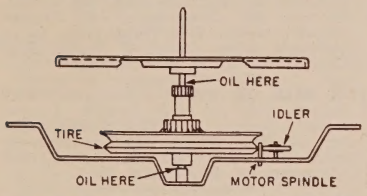
RCA thrust bearing assembly, part 38568, utilizes a ball bearing washer to replace the older turntable bearing of RP-139.

grease, being certain to clean out any chips which may have dropped into the bottom bearing. Before reassembling, lubricate all moving surface with a light coating of STAPUT 512, which can be purchased from E. F. Houghton & Co., Third St., and Lehigh Ave., Philadelphia, Pa., or their distributors.

Another method entails the purchase of RCA part number 38568 thrust bearing assembly. Install this ball bearing washer in place of the original unit and reassemble. Illustrated, are the positions of the various parts going into this assembly. The second method is recommended but the first is adequate if the 38568 kit is unobtainable.

Insufficient lubrication of the motor bearing will also result in slow speed and lack of torque. Remove the armature and clean it and the bearing with carbon tetrachloride. Judicious polishing with crocus cloth may be advisable as well.

Then use a good lubricant, proper for the job it has to do. Standard Oil Co. of Indiana puts out a Special Oil No. 11326 while Singer Sewing Machine oil is also a good lubricant.

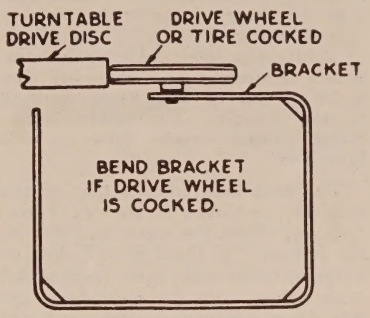


Inspect large drive tire of RCA RP-145.

The RCA record changer model RP-145 and similar model changers were used by a great many manufacturers other than RCA. Speed troubles in these mechanisms are generally traced to the large drive tire. This unit looks like a tricycle tire and often appears to be perfectly firm and not worn. However by all means change this part when trouble appears. The author has seen these tires give trouble although they appeared healthy enough to be mistaken for a new unit.

Symptoms of Trouble

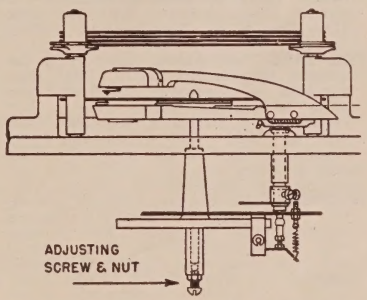
If further speed trouble is encountered, service the motor by using the method described above. Other symptoms that are the result of this tire



RCA RP-151 motor cradle and drive wheel.

trouble, are failure of the mechanism to complete the cycle and even jamming of the changer due to the fact that torque is insufficient to help the changer go through the difficult portion of the change cycle.

Now look at the illustration of the motor cradle and drive tires that are part of the V225 RCA phonograph



V225 mechanism of RP-151 has felt washer, reached for oiling by removing bottom screw.

mechanism. This is the RP-151 changer that plays both bottom and top of a record.

The motor used here is the General Electric rim drive with a field

tapped for a reverse winding. Service procedure is the same for this unit as for the conventional model. Assuming that motor and tires are in good condition, look for the cause of slow speed in the cradle itself. Make sure that the shape of the cradle matches that of a new changer. The cradle is of light gauge steel and is easily bent, thus a serviceman or a consumer may throw it out of line when working on the changer. This results in improper contact between drive tire and turntable.

The final illustration is that of the turntable employed in the V225 mechanism. Note the screw and nut on the bottom. If speed is still slow or wavering after you have checked all other causes, turn the mechanism upside down. Now loosen the nut and take out the screw. Inside the bearing you will find a felt washer. Dollars to doughnuts, you find this washer dry and curled up thus causing an internal bind in the turntable.

Pull out the washer, pour a little carbon tet into the bearing and wash it out thoroughly. Dry, insert the washer, and lubricate with a light oil. Wash the turntable rim, tires, etc., with a little carbon tet to remove any oil film that may accumulate as the result of lubrication. Also check the suspension spring that holds up the motor cradle. In time this spring loses tension. Snip off a few spirals; this should do the trick.

In general, it may be said that the modern phono changer is not difficult to service. Analytical patience and a few parts will take care of the bulk of service problems. These machines nowadays are not heavy, parts are inexpensive, and the number in use is growing all the time. The service of these units is proving to be a highly lucrative phase of the radio servicer's business.

THE RADIO TRADING POST

(Continued from page 4)

TRADE OR SELL—German P-38 automatic pistol with extra clip, holster and belt. Want communications equipment or parts. Offers please. Hart W. York, 119½ East 67 St., Los Angeles 3, Calif.

FOR SALE—Two Abbott ultra high frequency transceivers MRT3, TR4, semi-portable in operating condition, complete with hand mikes, storage batteries, and extra tubes. Best offer takes one or both. All replies answered. Charles H. Lyman, 226 South St., Hartford 6, Conn.

WANTED—Tube checker, signal generator (FM and AM), Oscilloscope, vacuum tube voltmeter, Rider's manuals, and tools. State price, model, age and condition. Seymour Hammer, 2090 Morris Ave., Bronx 53, N. Y.

WANTED—35 mm still camera and still strip projector. Will swap a good Simpson or Readrite V.O.M. or other test equipment. J. G. Brady, 701 N. Corry St., Pensacola, Fla.

WANTED—Bendix communication system, No. 3801 for 12 or 24 volts, consisting of transmitter and receiver, with power supply. Also AN-APR-1 UHF receiver. T. T. Crittenden, Box 56, Hillcrest Station, San Diego 3, Calif.

FOR SALE—Stancor A power pep, $40. One-quarter and one-sixth HP motors, $15 and $16. New model 1672 Triplett vibrator tester, $40. Want parts for a McMurdo Silver Model VI Radio. Paul Capito, 637 W. 21 St., Erie, Pa.

FOR SALE OR SWAP—Have good 9X12 Ihagee camera, f4.5 Ihagee Doppel Anast., Compur, DE, FPA, 2 PH, quantity of plate film, for S-40 receiver or what have you? Nathan Freilich, 566 Cleveland St., Brooklyn 8, N. Y.

WANTED—Daylight loading cartridges for Mercury 1 or Corsair 1 cameras. State price. About 7 wanted. Will buy or trade for with relays, ac voltmeter, 0-500 microammeter, tubes, etc. Cartridges needed urgently. Myron Weisberg, 2707 Creston Ave., Bronx 58, N. Y.

POSITION WANTED—Ex-Navy radio technician 1/c 4½ years experience, would like work in service shop or plant for servicing, testing, or assembling; radio, test, or high frequency equipment. Melvin Brown, 1122 May St., Hammond, Ind.

FOR SALE—QST backfile 1920-1937, both single copies and bound volumes, details on request. Robert Kruse, Madison, Conn.

FOR SALE OR TRADE—Carl Zeiss Jena 8 x 30 Deltrintem binoculars with ever ready case, excellent, $130 or trade for good audio signal generator, radio test equipment or what have you. Ed. W. Laas, 1931 Oakwood Ave., Toledo 7, Ohio.

SELL—Hickok 4955-S 4" meter, 2500v-500ma, 10 meg., $30. 1942 Philco record changer, new motor, $17.50. Rider's 1, 5, 9, 11, 13, new, $62.50. All or part. 25% deposit, balance C.O.D. C. Elgasser, Jr., 2771 A St., San Diego, Calif.

FOR SALE—Radio tubes, 1 volt, 6 volt, 12 volt, 35 volt, 50 volt, 117 volt, and a few 25 volt series. OPA discount schedule by quantity. Haven't many left. Plenty of hard-to-get numbers. Order your needs now! Roslem Sales Co., 1572 Harrison St., Denver, Colo.

FOR SALE—Signal tracer model CA10 with instructions. Checks audio, I.F., antenna stages. Has phone and neon test, matching impedence, attenuator, and R.F. probe. Price $10 plus shipping charges. Peter J. Labednick, 91½ Pine St., Nashua, N. H.

FOR SALE—Combination tube tester and radio check Roto-Ranger, model 220, in good shape. Make offer. Greener Radio Service, 299 S. Elmwood Ave., Buffalo 1, N. Y.

POSITION WANTED—Honorable Merchant Marine dischargee seeking employment in lab or radio corp. in or around New York City. Desirous and willing, no experience, $30. Lewis Mascara, 197 McKay Ave., Huntington St., Long Island, N. Y.

WANTED — Panel mounting auto-radio remote control, 10 : 1 ratio, for a 1939 Chevrolet, and cables. Albert C. Hart, 4848 Linden Ave., Hammond, Ind.

WANTED—One UTC S-35 filter choke, 20 Hy. 400ma, and one UTC S-36 swinging choke, 5-25 Hy. 400 ma. I need them badly. Will pay cash or trade. All letters answered. Abel Gomes, 8 Duke St., Ludlow, Mass.

FOR SALE — Majestic, Colonial, Philco, Zenith, and Victor chassis, some with speakers. Send for list and prices. Goldstone Radio, 1279 Sheridan Ave., Bronx 56, N. Y.

FOR SALE—Deluxe enclosed rack 61¼" by 19" panel space, black ripple, $33, or swap for what have you in 400 or 500 mil transformer and choke. Carl J. Visenti, 8 S. St. Louis Ave., Chicago 24, Ill.

FOR SALE—Radio tubes in cartons, brand new. Kenrad and National Union 60% off list. Also tubes at 50% off list. Send for complete list. C. W. Cassel, Box 203, Irwin, Pa.

WANTED—Am. Electronic frequency modulator, and automatic code sending for practice work. Have for sale transmitter, filament transformer, plate power transformer, 220v. T. H. Clark, 1821 N. Caroline St., Baltimore 13, Md.

WANTED — 8 mm projector as Ampro, Bell and Howell, DeJur or Kodak. Have price card outfit, portable radio, unused U.S. postage and cash. G. Samkofsky, 527 Bedford Ave., Brooklyn 11, N. Y.

FOR SALE OR SWAP—Triplett model 1201 set and tube tester and Superior signal generator. Also new 6V6GT tubes, 50 cents each. Or will sell signal generator for $15 and meter for $22. John R. Naples, 441 W. Madison Ave., Youngstown, Ohio.

WANTED—January and February, 1940 issues of "Radio" magazine. Will buy or trade for back issues of QST. A. B. Tyle, 1834 N.E. 52nd Ave., Portland 13, Ore.

FOR SALE—15 issues QST between 1927 to 1933. All copies 1934, 1935, 1936; most of 1937 and all copies for 1942. Total 77 copies, sell all or few, make offer. Also have 12 copies Radio from 1936 to 1939. Other odd Radio magazines. Total of all 141 copies. What am I offered? M. R. Shively, 3115 Ingham Rd., Lansing 10, Mich.

WANTED — Crankshaft for Caille Red Head 16 HP outboard motor. James Allen, 50215 Huron River Dr., Belleville, Mich.

FOR SALE—New radio cabinets, speaker baffles, record player bases or cabinets of our own original design. Wholesale prices in lots over six. For more information write to Adams Woodcraft, c-o Henry J. Wesoloski, 21 McKone St., Dorchester 22, Mass.

FOR SALE—New tubes, surplus, 2SL6 75 cents, 6SK7 75 cents, 6AC7 90 cents, 1625 85 cents, 808 $2.25. Handset push to talk $2.50. 2 volt Willard storage battery, $4. Other surplus xmitting cond., resistors, etc. Send for complete list. R. Boulle, 159 Orchard St., City Island, Box 64, N. Y.

FOR SALE—Rider's manuals 1 to 8 inc., $80. Extra Rider's indexes, 50 cents each. Gernsback manuals 1 to 4 inc., $20. Ghirardi's Radio Physics (1942), $2. E6B navigator's computers with case, $7.50. HRO coils, ham bands, $9.95. BC348 receiver, $39. BC 375E transmitter, $39. A. Livingstone, 12-02 Ellis Ave., Fair Lawn, N. J.

WANTED—Tube chart for Webber tube checker, model 210. Will pay cash for complete tube setting chart for above tube checker. McKoy's Radio Service, Conway, S. C.

FOR SALE—Complete 1925 International Correspondence School radio course consisting of 26 booklets including instruction booklet. Best offer takes it. Bill Thoma, 69 S. Sperling Ave., Dayton 3, Ohio.

FOR SALE—Complete material and test equipment, formerly used in sound systems repair shop. Includes many hard to get items. Send for free list. Belltone Sound Systems Co., 34 Madison Ave., New York 17, N. Y.

FOR SALE—Hallicrafters S-36, FM or AM. Covers both old and new FM BC bands, LF television bands, etc. 27.8 to 145 mc approx. tuning meter, noise limiter, BFO, switch for narrow or wide band FM, new deemphasis network, in cabinet, like new, perfect shape. Excellent HF-FM or ham receiver. F.O.B. Chicago, $227. Paul H. Prokes, 9216 S. Menard Ave., Oak Lawn, Ill.

FOR SALE OR EXCHANGE — Type C fixed laboratory resistors with adjustable band, 780 watts, various ampere and ohm ratings, Rex and Sticht mfg. Miscellaneous electrical insulation, porcelain, mica, and glass bushings, laminated plastic pieces, etc. Philip J. Moore, 4800 N. Lawndale, Chicago 25, Ill.

FOR SALE—Philco 044 audio signal generator, $15. 050 tube tester $35. 027 vac. tube voltmeter and circuit tester $35. 088 signal generator $12. Clough-Brengle osc. $15. All good condition. New tubes less 40%. Andrew, 740 Maple St., Bethlehem, Pa.

FOR SALE—Latest Sylvania tube checker. Clough- Brengle signal generator, Speco signal tracer, Sprague Tel-ohmike condenser and resistor tester, Rider's manuals vols. 1 to 12. Above equipment in A-1 condition. Best cash offer takes it. Joseph Wable, 319½ Beaver Ave., West Aliquippa, Pa.

FOR SALE—18" Jensen dynamic speaker. Self contained ac field supply, 80 tube included, A-1 condition, Excellent quality, 30-35 watts, $45. $5 with order, balance C.O.D. M. A. Porter, 1709 N. Larrabee St., Chicago 14, Ill.

FOR SALE OR TRADE—One model 35 Supreme tube tester, good condition. One model 38-7 Philco floor model console, A-1 shape, 2 bands. Also have Radio Craft and Short Wave-Radio-Television magazines from 1934. Have about two or three hundred. Will trade for cash or what have you. William E. Hagara, Box 224, Slickville, Pa.

FOR SALE — All types tubes including hard-to-get types, 10%-40% off list. Send your list for 4 day delivery. Harwood Radio Co., 4 Standish St., Dorchester 24, Mass.

FOR SALE OR TRADE—Triumph 1-77B and 351 V.O.M.'s, ac dc volt,, milliamp, and amphere meters. Tubes, radio parts, tools, etc. Want test equipment, communications receivers, Hammarlund (crystal) Super Pro. 1933-34, set of wound plug in coils, or what have you. Roby's Swapmart, 1119 Milwaukee Ave., Chicago 22, Ill.

FOR SALE—One SX 28A Hallicrafter with PM 15 speaker, in A-1 condition, $190. S. Palasek, 62 Main St., Port Washington, N. Y.

WANTED—Rider's manuals, set or single volumes. State condition and price. Richard Kennedy, Box 291, East Lansing, Mich.

FOR SALE—One Supreme model 585 diagnometer, deluxe series, kept in perfect condition, like new, $75. Edward Dorazil, Jr., 3310 Lincoln Ave., Chicago 13, Ill.

FOR SALE—Supreme Publications most used diagrams of 1939, $1.50 postpaid. Like new. James Wodjick, 65 Main St., Inkerman, Pittston, Pa.

FOR SALE—National receiver N-C 240D 10 band receiver with matching speaker. Also ATR 120 mil inverter, brand new, never used. Due to circumstances have no further use for same. Bargain. Martin Electronics, 142 Ralph Ave., Brooklyn 33, N. Y.

FOR SALE—Back issues of the I. R. E. Proceedings from Jan. 1941 to December 1946. Almost complete, 69 issues. Will sell singly or whole lot. Highest offer takes them. Alfred J. Moses, 550 79 St., Brooklyn 9, N. Y.

FOR SALE—Tubes. Have 300 new RCA 1B4-P all boxed individually. A direct substitute for 1A4P, 32 and 34. The first 100 at 70% off list, the second 100 at 75% off list, the lot for 80% off list. You can't lose on this deal. Also have 6 only 25A7 at $2 each. R. I. Beale, 4505 Gillham Rd., Kansas City, Mo.

FOR SALE—Audax D-38H 200 ohm magnetic pickup, Meissner 10-1104 BC and SW receiver in steel crackle cabinet. Philco 42-1010 record changer. Zenith 5S127 cabinet, 2 Utah 12" speakers, 1000 ohm and 2500 ohm fields. Eilers' Radio Service, Box 204, Gladbrook, Iowa.

FOR SALE—Triumph oscillograph, model 840, excellent condition, with instruction book. $50. A-1 Radio Service, 1748 East 177th St., Bronx 60, N. Y.

TRADE—Your name and address on a 3 line, cushion, index rubber stamp for 40 cents and 2 or more used radio magazines in A1 condition. Details 3 cents. J. T. Cookson, Puxico, Mo.

SCARCE TUBES at wholesale discounts. Also new, popular brands, in sealed cartons, all fully guaranteed. We ship anywhere. Write for free catalog of scarce tubes and parts. Commercial Radio, 36 Brattle St., Boston 8, Mass.

WANTED — January 1937 part 2, and March 1946 issues of I.R.E. Proceedings. Buy or will swap radio equipment (no junk). W. W. Smith, 201 E. Morrison Ave., Santa Maria, Calif.

FOR SALE—83 issues Short Wave Craft, Short Wave and Television, Radio and Television(same magazine through successive name changes), from November, 1934 to September, 1941. Excellent condition. Best offer. All replies answered. Veto M. Twaska, 3321 W. Carson St., Pittsburgh 4, Pa.

FOR SALE—Vomax 900 multitester, tube tester, signal tracer, capacity bridge, signal generator, dc to ac converter, speakers, 25 auto volume controls, new and used tubes, phono motor and turn table, etc. Send for list. Triplett's Radio, Box 56, Bixby, Okla.

FOR SALE—Late 1946 test equipment, guaranteed new. 1 model 561 RF-AF fre. mod. Supreme signal generator. 1 model 203 Hickok vacuum tube voltmeter. 1 model 636 Jackson tube tester. Priced right for quick sale because of new job. Howard F. Anderson, 28 Maple St., Torrington, Conn.

TRADE—Two receivers 100-180 mcs, 13 tubes, die cast chassis, micro tuning, 110-220 volt. Never connected up. Photographs 35 cents. Want 5" oscillograph, test gear, metal lathe. Alva Radio Lab, 712 Santa Fe St., Alva, Okla.

FOR SALE—Radio City electronic multitester, model 663A. Measures acv and dcv to 6000v. Ohms to 1000 megs. Capacities from 50 mmfd to 2000 mfd. Practically new. Complete with leads and instruction book. Has 4½" meter. $50. Ernest Kumfert, 21 Walker St., New London, Conn.

WANTED—Philco or other clock switch for radio capable of settings throughout a 12 hour day at 15 minute intervals. Chester Tietig, 1110 Mt. Allen Rd., Park Hills, Covington, Ky.

TRADE—Good automobile radio "Motorola" for a high reading dc ammeter plus a low reading voltmeter and a battery charger. R. Tammaro, 125 Navy Walk, Brooklyn 1, N. Y.

FOR SALE—Nos. 1 to 10 inclusive, Sam's Photo Facts. Alphabetically arranged, and all corrections inserted. Complete, rarely used, indexed. $10 cash only. Shipped P.P. or express collect. Parker 609 Ridge Ave. (rear), Pittsburgh 12, Pa.

FOR SALE—15 Detrola automatic changers used, good condition, make offer. Sachs Quality Stores, 330 Bruckner Blvd., Bronx 54, N. Y.

WANTED — Used preselector. Must be reasonable. Condition of cabinet unimportant so long as internally OK and in good working order. R. L. Bruce, 1171 Union St., Manchester, N. H.

SWAP—One 8" electrodynamic speaker, used but in perfect condition. Will swap for PM speaker of equal value, or what have you? Write stating offer. Jack A. Mason, Box 134, Altavista, Va.

FOR SALE—Triplett volt ohm milliammeter and Triplett battery operated all wave signal generator combined in portable leatherette case. Best offer takes it. B. Abrams, 1828 Longfellow Ave., Bronx 60, N. Y.

FOR SALE—Code tape machine, by Instructograph Co., with 5 tapes and built in oscillator, good condition, $15.85 postpaid. Also Ant. Tuning Unit, new, compact, for 600 kc to 18000 kc, $3.25 postpaid in U.S. Geo. Lund, 34 Chelten Rd., Havertown, Pa.

SELL OR TRADE—General Electric battery charger, tubes, radio receiving set, telephones that work, electric lighters, etc. Send for a copy Mail Gazette. Benjamin Estra, Box 290, New Haven 2, Conn.

WANTED—A circuit or Schematic diagram of a McMurdo Silver Masterpiece made about ten years ago. The circuit uses 20 tubes and 18" Jensen speaker. **John W. Yoder, 124 N. Porter St., Waynesburg, Pa.**

FOR SALE—900 watt phone transmitter, Thordarson transformer, National scope, ready for operation, $245 F.O.B. Paonia, Colo. F. E. Saint, Paonia, Colo.

TRADE — Zenith car radio, Confidence tube checker, code records, record changer, Mark Twain's works, sporting goods, photo items. Want test equipment, small drill press, pistol drill, etc. W. J. Closson, 295 8th St., Troy, N. Y.

AUTO RECEIVER SERVICING

(Continued from page 8)

For one thing, car owners are usually in a better position to pay any necessarily higher repair costs.

Service manuals covering the various auto sets are necessary, as much a part of the job as a screwdriver—they save time. Every step of the servicing operation should be studied to find ways of getting the set out of and back into the car with a minimum of effort.

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